

# NASA Goals, Implementing Strategies, and Objectives

## GRC FY2004 Milestones As of November 20, 2003

### GRC Strategic Management Key Process

**Implementing Strategy IS-1:** Achieve management and institutional excellence comparable to NASA's technical excellence.

**Objective IS-1.4.:** Unify the processes for strategic and budget planning, budget reporting, and performance planning and reporting.

**Objective IS-1.5:** Provide an integrated and user-friendly NASA-wide internet portal that will provide improved public access to NASA Mission results and other products, improved visibility into NASA plans and programs, and enhanced communication among NASA employees and contractors.

**4SM11.4.1 IFMP Budget Formulation:** Implement the budget formulation module at GRC in conjunction with the Project Office at GSFC. This includes support to the project office in the areas of requirement development, configuration testing, training development and administration at the center to applicable users.

**4SM11.5.1 External Customer Feedback System:** Develop a web-based system for collecting external customer compliments, complaints and suggestions, and link it to GRC's Corrective and Preventive Action Reporting System, and implement it Center-wide.

### GRC Enabling Services Key Process

**Implementing Strategy IS-1:** Achieve management and institutional excellence comparable to NASA's technical excellence.

**Objective IS-1.1:** Attract and maintain a workforce that is representative of the Nation's diversity and includes the competencies that NASA needs to deliver the sustained levels of high performance that the Agency's challenging mission requires.

**Implementing Strategy IS-2:** Demonstrate NASA leadership in the use of information technologies.

**Objective IS-2.2:** Enable NASA people to communicate across an integrated, low-cost information technology infrastructure.

**4ES11.1.1 Affirmative Employment Program (AEP) Annual Reports:** Complete the Center FY03 AEP Accomplishment Report and FY04 AEP Plan Updates as follows: AEP Accomplishment Report and Plan for Individuals with Disabilities; AEP Accomplishment Report and Plan for Disabled Veterans; Language Assistance Program (LAP) Assessment; Hispanic Initiative Program (HIP) Accomplishment Report; and the AEP Accomplishment Report and Plan Update for Minorities and Women.

**4ES11.1.2 Annual Discrimination Reports:** Complete the Center's Annual Discrimination Complaints Report.

**4ES12.2.1 Implement ODIN Delivery Order 2:** Implement the second delivery order of the Outsourcing Desktop Initiative for NASA contract. GRC is part of the Code R delivery order.

**4ES12.2.2 Agency Mac Browser Standard:** Develop recommendations for a new Agency browser standard for Macintosh operating systems as part of the NASA Competency Center for Architecture, Testing and Standards (NCCATS).

**4ES12.2.3 Agency Desktop Standards:** Complete the next revisions of the Agency 2804 and 2805 Hardware and Software Desktop Standards.

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**Implementing Strategy IS-4:** Ensure that all NASA work environments, on Earth and in space, are safe, healthy, environmentally sound, and secure.

**Objective IS-4.1:** Prevent injuries from occurring during the course of NASA activities on NASA facilities or in the use of NASA equipment.

**Objective IS-4.2:** Work closely with other Government agencies and local authorities to identify and try to remove all security threats to NASA people, facilities, and information.

**Objective IS-4.5:** Eliminate environmental incidents, toxic chemical use, hazardous waste, and environmental liability at all NASA sites.

**Implementing Strategy IS-5:** Manage risk and cost to ensure success and provide the greatest value for the American public.

**Objective IS-5.1:** Provide tools, techniques, and expertise that will enable all elements of the Agency to make well-informed decisions on

**4ES14.1.1 Voluntary Protection Program (VPP):** Submit application for GRC VPP registration.

**4ES14.2.1 Facility Security Enhancement:** Implement Facility Security Enhancement modifications for specific GRC buildings.

**4ES14.5.1 ISO 14001 Registration:** Successfully complete two outside audits demonstrating compliance of the GRC ISO-14000 registered Environmental Management System.

**4ES14.5.2 Plumbrook Reactor Decommissioning:** Complete segmentation of the Reactor Tank. Remove the Reactor Tank, Reactor Internals, and other Fixed Equipment from the facility and ready the material for disposal.

**4ES15.5.1 Continuous Risk Management Implementation:** Facilitate the GRC Continuous Risk Management Implementation process for an additional 12 GRC projects.

**4ES15.5.2 Process Based Mission Assurance:** Ensure Secure Socket Layer Workgroup and PBMA Knowledge Registry capabilities.

### GRC Program and Project Management & Science, Research and Technology Key Processes

**Goal 2:** Enable a safer, more secure, efficient, and environmentally friendly air transportation system.

**Objective 2.1:** Decrease the fatal accident rate, reduce the vulnerability of the air transportation system to hostile threats, and mitigate the consequences of accidents and hostile acts.

**4A2.1.1 LEWICE Version 3 2D Ice Accretion Code:** Release validated 2D ice prediction code with improved physical modeling of ice growth, expanded validation of thermal algorithms, additional subroutines for multi-element airfoil protection analysis, and expanded operational capability from the current LEWICE version.

**4A2.1.2 Fire Explosion/Detection Technologies:** Develop and test Low-False-Alarm Fire Detection System Technology and Elevated Flashpoint Fuel Concepts. Write reports of technology attributes and implementation issues in relation to AvSP Accident Mitigation project goals.

**4A2.1.3 Interim Assessment of Next-Generation Cockpit Weather Communications Technologies:** Complete interim assessment of development progress of next-generation cockpit weather communications technologies.

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**Objective 2.2:** Protect local and global environmental quality by reducing aircraft noise and emissions.

**Objective 2.3:** Enable more people and goods to travel faster and farther, with fewer delays.

**Goal 3:** Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies, industry and academia.

**Objective 3.3:** Resolve scientific issues in the low gravity environment of space that enrich life on Earth by leading to better design tools in energy, materials, medical, and communication technologies.

**4A2.1.5 High-Strength Turbine Disks and Engine Containment Materials [NASA APG 4AT5]:** Develop prototype disks and engine containment materials with inherent failure-resistant characteristics that will be ready for full-scale testing to be conducted in FY 2005.

**4A2.2.1 Noise Mitigation Roadmap for Constant Volume Combustion Cycle Engine:** Noise mitigation roadmap for constant volume combustion cycle engine developed.

**4A2.2.2 Wind Tunnel Test Quiet High Speed Fan 2:** In collaboration with Honeywell, conduct a four-month long wind tunnel evaluation of the aerodynamic and acoustic characteristics of a low-noise, forward-swept fan concept in the GRC 9x15 wind tunnel.

**4A2.2.3 Advanced Flow Diagnostics for Jet Noise Prediction:** Complete implementation and validation testing of Particle Image Velocimetry and Rayleigh Scattering measurement capabilities on Small Hot Jet Acoustic Rig in Aeroacoustic Propulsion Lab.

**4A2.2.4 Airframe and Engine Source Noise Reduction Concepts [NASA APG 4AT8]:** Validate initial concepts for engine and airframe source noise reduction by 5dB (compared to CY2001 state-of-the-art).

**4A2.2.6 Experimentally Demonstrate Two-Stage Highly-Loaded Compressor [NASA APG 4AT9]:** Experimentally demonstrate a two-stage highly loaded compressor for increasing pressure rise per stage.

**4A2.2.7 Determine Technologies and Platforms for TRL6 Demos Partnership with U.S. Industry:** Complete decisions on TRL 6 Demonstrations in Partnership with U.S. Industry.

**4A2.2.8 Intelligent Propulsion Systems Foundation Technologies Selection:** Select through competitive process the foundation technologies for Intelligent Propulsion Systems.

**4A2.2.9 Initial High Fidelity Engine System Simulation:** Predict steady state aerodynamic performance of selected engine system at take-off and cruise conditions using high-fidelity system simulation tools.

**4A2.2.11 Preliminary System Requirement for aircraft all-electric secondary power system:** Preliminary system requirements for all-electric secondary power system for aircraft defined.

**4A2.3.2 Ku-Band Satellite Communications Technology Demonstration:** Demonstrate satellite technology with other wireless links and network connections as applicable for aviation.

**4B3.3.2 Multiuser Droplet Combustion Facility Flight Hardware:** Complete Multiuser Droplet Combustion Facility Pre-Ship Review.

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**Goal 4:** Explore the fundamental principles of physics, chemistry, and biology through research in the unique natural laboratory of space.

**Objective 4.2:** Expand understanding of physical processes and insight into the laws of nature through space-based investigation.

**4B4.2.1 Boiling Experiment Facility Flight Hardware:** Complete preship review for the Boiling Experiment facility including the first two facility payloads -- Microheater Array Boiling Experiment and Nucleate Pool Boiling Experiment.

**4B4.2.2 Boiling Experiment Facility CDR:** Complete Critical Design Review for the Boiling Experiment facility including the first two facility payloads -- Microheater Array Boiling Experiment and Nucleate Pool Boiling Experiment.

**4B4.2.3 Light Microscopy Module CDR:** Complete the Light Microscopy Module Critical Design Review. The LMM is the first multiuser module for the Fluids Integrated Rack.

**4B4.2.4 CIR Flight Hardware:** Complete the preship review for the Combustion Integrated Rack (CIR). The CIR is the first rack of the Fluids and Combustion Facility.

**4B4.2.6 MIDAS PDR:** Complete the Miscible Interface Dynamics and Simulation experiment Preliminary Design Review.

**4B4.2.7 Bouyancy-Driven Instabilities in Single-Bubble Sonoluminescence CDR:** Complete the Bouyancy-Driven Instabilities in Single-Bubble Sonoluminescence Critical Design Review.

**4B4.2.9 Flow Enclosure Accommodating Novel Investigations in Combustion of Solids PDR:** Complete Flow Enclosure Accommodating Novel Investigations in Combustion of Solids project Preliminary Design Review process.

**4B4.2.11 Triaxial Sensor Head- Ethernet Standalone:** Deliver flight TSH-ES to CIR for integrated testing.

**Goal 5:** Explore the solar system and the universe beyond, understand the origin and evolution of life, and search for evidence of life elsewhere.

**Objective 5.1:** Learn how the solar system originated and evolved to its current diverse state.

**4S5.1.1 Stirling Thermal-Vacuum Test:** Complete thermal-vacuum performance test of Stirling converter.

**4S5.1.2 NEXT Generation Ion Thruster Life Test:** Initiate long duration ion thruster life test.

**4S5.1.3 Stirling Extended Test:** Accumulate 3,000 hours of extended testing on a matched pair of Stirling Technology Development Convertors 13 and 14.

**4S5.1.4 Hall Thruster High Power Testing:** Complete high power, high voltage test of Hall 400M Thruster at over 50kW and 4500 sec Isp.

**4S5.1.5 Stirling Launch Environment Vibration Test:** Complete launch environment vibration test of advanced lightweight Stirling converter.

**4S5.1.6 RPS Contracts:** Initiate all Advanced Radioisotope Power System NRA contracts.

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**Goal 8:** Ensure the provision of space access, and improve it by increasing safety, reliability and affordability.

**Objective 8.2:** Improve the safety, affordability and reliability of future space transportation systems.

**4S5.1.7 NPR Phase I Reports:** NRA Power contractors to document results of Phase I activities (trade studies, conceptual designs, and Phase II technology plans).

**4S5.1.8 JIMO Brayton ATU:** Complete 100KW Brayton ATU (Alternator Test Unit) design.

**4S5.1.9 JIMO EP Demo:** Jupiter Icy Moon Orbiter (JIMO) EP concept thruster demonstration.

**4A8.2.1 C/SiC Life Demonstration:** Demonstrate the effects of commingling SiC and heat treated carbon fibers on C/SiC life in an oxidizing environment.

**4A8.2.2 Miniaturized Sensor Array:** Complete fabrication and integration of hardware and sensor array for miniaturized hardware prototype demonstration.

**4A8.2.3 Electro-Mechanical Actuator:** Deliver prototype Electro-Mechanical Actuator (EMA).

**4A8.2.4 Electro-Hydrostatic Actuator:** Deliver prototype Electro-Hydrostatic Actuator (EHA).

**4A8.2.5 RTA-1 SSR:** Complete Systems Requirements Review for Revolutionary Turbine Accelerator-1.

**4A8.2.6 RTA-1 PDR:** Complete the Preliminary Design Review for Revolutionary Turbine Accelerator-1.

**4A8.2.7 High Speed Fan for Mach 4 Turbine Testbed:** Complete the design for a high speed fan for the Mach 4 turbine.

**4A8.2.9 DCCR Test:** Perform Mach 3.5 Direct Connect Combustor Rig test.

**4A8.2.10 OSP 8x6 SWT Testing:** Complete 8x6 Supersonic Wind Tunnel Testing of Lockheed-Martin Subscale Model of the Orbital Space Plane (OSP).

**4A8.2.11 GRCop-84 Calorimeter Liner:** Deliver metal spun GRCop-84 calorimeter liner preform suitable for machining into finished liner.

**4A8.2.12 PR&T NRA and GLS Awards:** Complete competitive sourcing for Propulsion Research and Technology via NRA and GLS solicitations, including selection and contract awards.

**4A8.2.13 Turbine Power Unit:** Deliver brassboard of Turbine Power Unit (TPU).

**4A8.2.14 Advanced Control Surface Seals:** Complete critical function performance tests on advanced control surface seals.

**4F8.2.1 Shuttle RTF Ballistic Impact Testing:** Complete ballistic impact testing for Shuttle Return to Flight.

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**Goal 10:** Enable revolutionary new capabilities through new technology.

**Objective 10.2:** Create system concepts and demonstrate technologies that will enable new science measurements and scientific missions.

**4A10.2.1 Solid-State High-Efficiency Space Communication Devices:** Deliver packaged, prototype solid state microwave devices for near earth and deep space communications applications which operate at high overall efficiency (>50%) compared to current state-of-the-art devices.

**4A10.2.2 Highly-Efficient, Miniature Traveling Wave Tube (TWT):** Deliver a prototype TWT for near earth and deep space communications applications that, using a novel internal design, which exhibits both increased efficiency (>55%) and reduced mass and volume (>20%) compared to current state-of-the-art devices.

**4A10.2.3 Spacecraft Networking Technologies [NASA APG 4MSM11]:** Develop critical spacecraft networking technologies. Demonstrate spacecraft communications technologies achieving 1Gbps or greater for near Earth, and 1Mbps or greater for deep space applications. Develop related protocols and software for Internet-like space computing and communications.

**4A10.2.4 Lithium Battery Polymer Electrolyte:** Select polymer electrolyte candidates with suitable characteristics for lithium polymer batteries.

**4A10.2.5 Lightweight Propellant Feed System:** Demonstrate feed system for ion thrusters that is 1/10 the weight of current systems.

**4A10.2.6 Pathfinder Sub-Kilowatt Ion Thruster [NASA APG 4MSM4]:** Investigate performance and stability of a sub-kilowatt ion thruster concept to lay foundation for potential REP mission application.

**4A10.2.7 Intelligent DC/DC Converters:** Develop distributed control in modular DC-DC converters and demonstrate active current sharing, efficiency optimization, and phase-stagger switching between multiple DC-DC converters.

**4A10.2.8 Information Environments for Grid Applications:** Develop and demonstrate distributed coupling of two computational fluid dynamics analyses executing on the Information Power Grid, including the usage of a web-enabled visual assembly and Developer's Kit capabilities. Comparing against a 2000 baseline, these capabilities reduce by a factor of five the time required for coupling the codes.

**4A10.2.9 Outer Loop Control:** Simulation demonstration of outer loop control to optimize performance and/or operability based on mode of operation.

**4F10.2.1 Federal Spectrum Policy:** Support HQ in providing NASA's contribution to the development of recommendations for improving spectrum management policies and procedures to stimulate more effective, efficient and beneficial use of spectrum by the Federal Government.

**4F10.2.2 Ultra Wideband Noise Floor Study:** Determine the noise floor environment in critical spectrum bands to enable an assessment of the adverse effect on the noise floor that would be caused by widespread commercial use of ultra wideband devices in these bands. In particular, study the effect on aviation navigation systems.

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## GRC Knowledge and Technology Transfer Key Process

**Goal 3:** Create a more secure world and improve the quality of life by investing in technologies and collaborating with other agencies.

**Objective 3.2:** Improve the Nation's economic strength and quality of life by facilitating innovative use of NASA technology.

**4KTT3.2.1 Technology Transfer and Partnership Performance and Impact Report:** Publish a TT&PO Performance and Impact Report.

**4KTT3.2.2 National SBIR/STTR Conference:** Co-host the National SBIR/STTR Conference with the Ohio Department of Development and US Air Force Wright Labs.

**4KTT3.2.3 Annual Research and Technology Report:** Highlight GRC's research and technology accomplishments and identify practical and beneficial applications.

**Goal 6:** Inspire and motivate students to pursue careers in science, technology, engineering and mathematics.

**Objective 6.1:** Increase the number of elementary and secondary students and teachers who are involved in NASA-related education.

**4ED6.1.1 Video/Webcast Event:** Conduct at least one video conference or webcast to reach the NASA Explorer Schools within the GRC region utilizing NASA content-based Science, Technology, Engineering and Mathematics (STEM) materials and programs.

**4ED6.1.2 SEMAA Family Component:** Provide training on Science, Engineering, Mathematics and Aerospace Academy (SEMAA) family involvement activities to NASA Explorer Schools Family Coordinators.

**Objective 6.2:** Support higher education research capability and opportunities that attract and prepare increasing numbers of students and faculty for NASA-related careers.

**4ED6.2.1 College and Career Event:** Provide a faculty and student event during the Lewis Educational Research Collaborative Internship Program (LERCIP) summer internship program that relates academic programs to NASA STEM career fields.

**4ED6.2.2 University Linkages to Human Capital Initiative:** Establish linkages between universities participating in the GRC Scholar's Program and the NASA Corporate Recruitment Strategy in support of the Agency's Human Capital Initiative.

**4ED6.2.3 NASA Scholars Symposium:** Conduct a research symposium for NASA Scholars involved in the internship program to present the results of their research.

**Objective 6.3:** Increase the number and diversity of students, teachers, faculty and researchers from underrepresented and underserved communities in NASA-related STEM fields.

**4ED6.3.2 Integrate SEMAA Curriculum at Four Sites:** Integrate four new Science, Engineering, Mathematics and Aerospace Academy (SEMAA) sites into the National SEMAA program in order to increase the number and diversity of participants from underrepresented and underserved communities in NASA-related STEM fields.

**4ED6.3.3 STEM Protocol:** Develop a protocol to establish a baseline of elementary and secondary teachers participating in NASA programs and utilizing NASA content-based STEM materials.

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**Objective 6.4:** Increase student, teacher, and public access to NASA education resources via the establishment of e-Education as a principle learning support system.

**Goal 7:** Engage the public in shaping and sharing the experience of exploration and discovery.

**Objective 7.1:** Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research, and exploration missions.

**04ED6.3.4 GRC Student Recruiting Strategy:** Develop and implement a strategy to recruit more students for underrepresented and underserved communities participating in GRC Student Programs (including SHARP, NASA plus, LERCIP College, Shadowing, and Explorers). This will increase the number and diversity of participants.

**4ED6.4.1 Centennial of Flight Software:** Develop on-line educational software to support the centennial anniversary of powered flight.

**4ED6.4.2 EDD Learning Network:** Develop the infrastructure for an Educational Digital Distance Learning Network that will have the capability to deliver NASA unique content to Education and Outreach audiences contingent upon Code N funding. This will increase access to resources via e-Education.

**4KTT7.1.1 Mars Simulation Scenario:** Design and document a scenario for a Mars Simulation.

**4KTT7.1.2 Aerospace Education Family Conference:** Conduct an Aerospace Education Family Conference that will introduce families from the Great Lakes Region to NASA educational resources through workshops, demonstrations and related Education Programs Office resources.

**4KTT7.1.6 Media Relations Annual Report:** Publish first annual report showcasing the amount of media coverage generated for the Center.